ARMED SERVICES BOARD OF CONTRACT APPEALS

Appeal of --	)	
	)	
Kaco Contracting Co.	)	ASBCA No. 46346
	)	
Under Contract No. N62467-81-C-0959	)	

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OPINION BY ADMINISTRATIVE JUDGE GROSSBAUM

This dispute arises under a contract to construct a new fire station and install a wireless fire alarm system at a military facility. The appeal was taken from a contracting officer's decision denying, in part, appellant's claim for $526,262 and 474 days of delay and assessing $7,200 in liquidated damages. The contractor alleges a series of compensable Government caused delays and constructive changes. The claimed monetary adjustment also includes extra costs allegedly incurred by appellant's electrical subcontractor, whose claim was sponsored by the prime contractor in this proceeding. Only entitlement is before us for consideration.

The record includes appeal file papers submitted and supplemented by the Government (R4, tabs I-A to VIII-Y; SR4, tabs 1-16) and appellant (AR4, "items" 1-17 [papers within each "item" are Bates numbered, with the last three digits cited herein]; App. supp. R4, tabs 1-15) and exhibits (ex.) received in evidence.

FINDINGS OF FACT

1. On 23 February 1987 the Government awarded Contract No. N62467-81-C-0959 to appellant, Kaco Construction Company (Kaco), to replace an existing fire station and install a new radio controlled fire alarm system at the Naval Training Center (NTC), Orlando, Florida, for the firm-fixed price of $1,074,000. The general scope of work called for constructing a new "Fire Station Facility, complete and ready for use," installing a new

base-wide radio controlled (wireless) fire alarm system over an existing "hard wired" alarm system, and demolishing the existing fire station. The new fire station building was described generally as:

> One story masonry load bearing structure with concrete floor slab on grade and a single-ply roof membrane over lightweight insulating concrete deck on steel bar joists. . . . . Supporting facilities include extension of utilities including water distribution lines, sanitary sewer lines, electrical transformer, emergency generator with fuel storage tank . . . .

The new alarm system would be connected to approximately 138 buildings at NTC and at two nearby annexes. (R4, tabs I-A, -C, -E)

2. The solicitation for the procurement had included several separate bid items. Additive Item No. 4 to the solicitation called for "landscaping and irrigation in lieu of sod." This item was not awarded as part of the resulting contract. (R4, tab I-A)

3. Construction work was to be performed in two phases. Phase A, construction of the new fire station facility, was to commence "15 days after the date of Award" (10 March 1987) and was to be complete within 304 days thereafter (8 January 1988). Phase B, demolition of the existing fire station, was to start after a 14 calendar day hiatus (22 January 1988) and was to be completed in 30 days (21 February 1988). The total time for completing the entire work was 348 calendar days. Among other things, the alarm system was to be installed during Phase A and removal of "asbestos-containing material" was to occur during the Phase B fire station demolition work. (R4, tabs I-A, -C)

4. Special provisions or paragraphs applicable generally to the entire contract appeared in specification Section 01011, General Requirements. Under that section, Paragraph 4, Commencement, Prosecution and Completion Of Work (Phased Work), provided in part:

> 4.3 Schedule: Existing facility shall remain operational during construction of new facility. New facility shall be substantially complete (operational) prior to demolition of existing facility.

Special Provision 5 in Section 01011 also prescribed liquidated damages for late completion of the "work within the time specified for each phase" at the following daily rates: Phase A - $225.00; Phase B - $50.00. According to this provision: "[i]n the event that more than one phase of the work is in arrears at the same time, damages will be assessed concurrently." (R4, tabs I-A, -C)

5. The contract general provisions included the standard Suspension of Work (APR 1984), Differing Site Conditions (APR 1984), Changes (APR 1984), Government Property (Fixed Price Contracts) (APR 1984) and Default (Fixed-Price Construction) (APR 1984) clauses as prescribed by FAR 52.212-12, 52.236-2, 52.243-4, 52.245-2, and 52.249-10, respectively. The general provisions also included the FAR 52.236-21 Specifications and Drawings for Construction (APR 1984) clause, which stated in part:

> (e) . . . Approval [of shop drawings] by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, not [sic] from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with (f) below.
>
> (f) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission. If the Contracting Officer approves any such variation, the Contracting Officer shall issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

(R4, tab I-B) In addition, the general provisions contained the FAR 52.236-15 Schedules for Construction Contracts (APR 1984) clause, which required the contractor to submit for the contracting officer's approval:

> a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the several salient features of the work (including acquiring materials, plant and equipment). The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period. . . .

The Schedules for Construction Contracts clause was further implemented by specification Section 01011, Paragraph 18, Progress Charts And Equipment Delivery Schedule, which required the contractor to submit its construction schedule to the contracting officer within 15 days after receipt of award and to submit for approval a schedule showing its procurement plans for materials, plant and equipment within 45 days after award. Moreover, Section 01011, Paragraph 30, Contractor's Daily Report, required the

contractor to submit a "Daily Report to Inspector" (DRI) describing work performed and resources furnished and/or used each day. (R4, tab I-C)

6. Both specification Section 01011 and Section 16723, Fire Alarm System Radio Type, required that fire alarm protection remain continuous and operational. Paragraph 7 of Section 01011 stated in part:

> 7.1 Continuity of Fire Alarm System: During installation of system, there shall be no loss of function of the existing base fire alarm system, or of the local building alarm systems connected thereto. Transfer of local alarm system connections from the existing base alarm system shall not result in loss of alarm transmitting or receiving capability. Temporary interruption of individual building alarm connections, not to exceed 8 hours duration, will be permitted at the discretion of the Contracting Officer.

(R4, tab I-C)

7. Part 3, Execution, of specification section 02821, Grassing, provided:

> 3.1 GENERAL REQUIREMENTS: All areas within the limits of work not indicated for development otherwise, and all other areas disturbed by the Contractor's operations, shall be grassed.
>
> 3.2 SODDING: Soil shall be moist just prior to laying sod. Sod blocks shall be placed in rows . . .

(R4, tab I-C)

8. Part 2, Products, of specification section 16301, Underground Electrical Work, stated in part:

> 2.4 WIRE AND CABLE: . . . Wires and cables manufactured more than 12 months prior to date of delivery to the site shall not be used.
>
> * * *
>
> 2.4.2 Medium Voltage Cable: . . . The year of manufacture shall be durably marked on the outer surface of each cable at regular intervals throughout cable length.

(R4, tab I-C)

9. Specification section 16610, Lightning Protection System, provided in part:

1.3 SUBMITTALS:

1.3.1 Shop Drawings: . . . Shop drawings shall contain details to demonstrate that the system has been coordinated and will function as a unit . . .

* * *

2.2 MATERIALS:

2.2.1 Main and Secondary Conductors: Conductors shall be in accordance with NFPA [National Fire Protection Association] 78 and UL [Underwriter's Laboratory] 96 for Class I materials.

2.2.1.1 Aluminum: Aluminum shall not contact the earth or be used in any other manner that will contribute to the rapid deterioration of the metal. Appropriate precautions shall be observed at connections with dissimilar metals. Aluminum conductors for bonding and interconnecting metallic bodies to the main cable shall be at least equivalent to strength and cross-sectional area of a No. 4 AWG aluminum wire. . . .

* * *

3.1.1.2 Roof Conductors: Roof conductors shall be connected directly to the parapet with adhesives compound as indicated on the drawings. . . All connections shall be electrically continuous. Roof conductors shall be coursed under roof deck, where indicated on the drawings, along the contours of flat roofs and ridges and where necessary, over flat surfaces in such a way as to join all main conductors. Roof conductors along parapets shall be coursed on top of parapet. Roof conductors surrounding decks, flat surfaces and flat roofs shall be connected to form a closed loop.

* * *

3.2 INTERCONNECTION OF METAL BODIES: Metal bodies of conductance shall be protected if not within the zone of

> protection of an air terminal. All metal bodies of conductance having an area of 400 hundred square inches or greater or a volume of 1000 cubic inches or greater shall be bonded to the lightning protection system . . .

(R4, tab I-C) Specification Section 16610 was complemented by drawing sheet E-7, Fire Station Facility Lightning Protection Plan, which depicted the roof plan for the lightning protection system. It is undisputed that the lightning protection plans and specifications were performance specifications. (R4, tab I-C; tr. 1/39, 2/54-55, 5/84)

10. Specification Section 16723, Fire Alarm System Radio Type, required the contractor to provide "a complete and usable base-wide radio fire alarm system. . . . in accordance with NFPA 1221 . . ." The material and equipment furnished for the system – radio alarm transmitters, interface devices, antennas, antenna towers, base receiving consoles, and power supplies, including batteries – were required to be "the current products of one manufacturer regularly engaged in production of such equipment." Submittals covering the foregoing items were to be reviewed and approved by the fire protection engineer at the Naval Facilities Engineering Command's (NAVFAC's) Southern Division in Charleston, South Carolina. The new alarm system equipment did not include local control panels, which process signals to be transmitted from each building to the base receiving consoles. Instead, the contractor was required to "interface" or hook the new transmitters into existing alarm panels in each building.

a. Under Part 1, General, of Section 16723, prior to commencing work the contractor was required to submit data showing that it or its subcontractor had experience "successfully install[ing] radio fire alarm systems of the same type and design" as provided under the contract. The contractor was also required to provide the services of a qualified manufacturer's representative, experienced in the installation and operation of the type of system being provided, "to supervise the installation, testing (including final testing) and adjustment of the system."

b. Paragraph 2.1 of Specification Section 16723 provided:

> 2.1 RADIO ALARM TRANSMITTERS (GENERAL): Each radio alarm transmitter shall be completely assembled, tested at the factory, and delivered ready for installation and operation. The transmitter electronics package shall be contained within the housing as a complete assembly, removable to facilitate servicing and replacement. Transmitters shall be crystal controlled for operation on any frequency within the 138 to 174 MHz band. The specific operation on any frequency shall be as directed by the

Contracting Officer, in consultation with the Area Radio Frequency Coordinator, within 45 days after contract.

Subparagraphs under Paragraph 2.1 of Section 16723 required each installed transmitter to produce a visual indication at the new fire station confirming that the transmitter was operating and sending a signal. Among other things, each transmitter would send: a "tamper" message (signaling that a transmitter housing door had been opened); a "low battery" message; and a "trouble" message and alarm (signaling either disarranged transmitter wiring or the abnormal position of any switch, or both), with an amber trouble lamp to remain lit after the trouble alarm had been silenced. Each transmitter was to have separate alarm and trouble lamps to indicate the status of each initiating zone. All switches and other controls in each transmitter housing were to be inaccessible without the use of a key.

c. Paragraphs 3.5 and 3.6 of Section 16723 prescribed testing requirements for the system. The contractor was to notify the contracting officer in writing when the system was ready for final acceptance tests, which could not take place until the system had been in service for at least 15 days and "only after the necessary preliminary tests have been made and all deficiencies found have been corrected to the satisfaction of the equipment manufacturers technical representative." Any deficiencies found during the final inspection were to be corrected and the system was to be retested at no cost to the Government. (R4, tab I-C)

11. The fire protection (FP) drawings provided with the solicitation and included in the resulting contract had been produced by Millward Engineering (Millward), a subcontractor to Vickrey Ovresat Awsumb, Inc. (VOA) the project architects. Millward had surveyed each building to locate and identify the type of each existing fire alarm panel and to determine a location for the new transmitter and new outside antenna. Millward's survey was conducted approximately one year before the contract was awarded, but did not include determining whether the existing panels were in working order. (Tr. 1/292-93, 303, 309) Among other things, these drawings included:

a. Drawings FP-4 through FP-17, which indicated, *inter alia,* the manufacturer of each of the existing alarm panels. General notes to drawing FP-1 required, among other things, ". . . wiring from transmitter to alarm panel to provide 1 zone alarm indication and 1 zone trouble. If wiring is from a coded transmitter, omit the trouble indication" and stated in part: "[c]oded transmitter - replace code wheel relay with a normally open contact relay and connect to transmitter to provide alarm." Moreover, drawings FP-1 through FP-17, called for added coded wheel alarm relays for 27 identified buildings.

b. General Note 6 to Drawing FP-1 indicated that all antennas were to be mounted "just above the roof line, unless otherwise indicated. Roofs are 2 or less stories above ground, except as noted . . . ." Other FP drawings (FP-4 through FP-17) indicated the

antenna locations by a small box with the letter "A" inside it. Specific directions on certain drawings indicated placing the antennas higher than 20 feet, as follows:

FP-6	Bldg. 310	Mount on wall at +20′
FP-12	Bldg. 2078	Mount . . . 30′
	Bldg. 2089	Mount at 25′+/–
FP-16	Bldg. 7153	Approx. 30′ high
	Bldg. 7151	Approx. 30′ high

(R4, tab I-D; FP-1, -6, -12, -16; tr. 4/65)

12. Before Kaco submitted its bid, representatives of its electrical subcontractor, G & L Electric (G & L), who would also install the radio fire alarm system, and of its intended alarm system supplier, Seaboard Electronics (Seaboard), visited the project site. G & L's owner, Mr. Gordon Gilliam, visited approximately six buildings, all located near the old fire station, that were to receive radio fire alarm transmitters. Mr. Gilliam had reviewed all of the FP drawings in the solicitation to identify the types of existing panels that were in the affected buildings. During his site visit, Mr. Gilliam brought with him the drawings of each buildings' electrical panels and in each building he visited he examined existing panels to see if they were capable of handling the system that was going to tie into them. Mr. Gilliam did not find any discrepancy between what he was observing in the existing panels and what the drawings showed. Mr. Gilliam was also aware, prior to bidding, that there were numerous different types of panels throughout NTC and that some of the manufacturers of the existing panels were out of business. (Tr. 2/94-96, 224, 229-33, 243-45, 4/8)

13. Although Kaco had some experience working with radio alarm systems, the NTC contract represented the first time Kaco would install a complete new wireless alarm system over an existing hardwire alarm system. Similarly, although G & L had performed several projects for Kaco, at least one of which involved a hardwired alarm system, it had never installed a radio fire alarm system. However, there is no evidence in the record showing that the Government took any issue with the experience and qualifications of either Kaco or G&L at any time relevant to this appeal or even requested information about the qualifications of its installer, G & L, until nearly 18 months after the contract was awarded. (Tr.1/128, 169-71, 175-76, 2/90-93, 224-27; R4, tab IV-T)

14. Sometime in February 1987, around the time the contract was awarded, Mr. Sid Earley, a consultant who also acted as military sales representative for Signal Communications (SIGCOM), of Woburn, Massachusetts, contacted Kaco regarding the

possibility of SIGCOM becoming the radio alarm equipment supplier for the contract (tr. 5/131, 140).

15. By letter dated 10 March 1987, VOA cautioned the NAVFAC Southern Division that "the primary electrical and communications duct banks, which will serve the Fire Station Facility . . . are included with the Construction contract for the Barracks" and that the Navy must insure that "these primary ducts are scheduled in a timely manner in order for permanent power to be available for tie-in when required by the General Contractor for the Fire Station Facility" (AR4, item 2 #027; tr. 1/100)

16. A preconstruction conference was conducted at the office of the Resident Officer-in-Charge-of-Construction (ROICC) at NTC on 12 March 1987. During the conference the parties reviewed VOA's 10 March 1987 letter and considered its implications. Among other things, the parties specifically discussed the oil switch (an equipment item that receives the high voltage electric power coming onto the base, which was crucial to providing permanent power to the new fire station, and which was to be provided by a separate prime contractor who was constructing barracks) and their expectation that the oil switch would be available by late September or early October 1987. Kaco also informed the Government that it planned to acquire the radio transmitters and other equipment associated with the new alarm system from Seaboard. (Tr. 1/100, 149; app. supp. R4, tab 5 at 2)

17. Shortly after the preconstruction conference, Mr. Gilliam again visited NTC to spot-check buildings on different areas of the base and examine the existing panels. Mr. Gilliam could not recall how many different types of panels he observed nor how many and which buildings he visited on this occasion, although he assumed that the buildings he looked at were representative of what he would find on the rest of the base. During this spot-check, Mr. Gilliam opened up the existing panel boxes and looked at them to see if they were compatible with the new radio alarm system, but he did not notice if the panel schematics, which were typically folded up inside the panel box, were in the boxes. (Tr. 2/234-39, 242)

18. In accordance with the Schedules for Construction Contracts clause, Kaco submitted for the contracting officer's approval one or more proposed progress schedules that were rejected. However, the Government eventually approved the Kaco progress schedule that the NTC ROICC office received on 29 June 1987. The approved progress schedule was a bar chart and did not include either a network analysis or a critical path plan. Among other things, the schedule indicated that fire alarm system submittals would be reviewed and released by the end of May 1987 with three shipments of fire alarm equipment to begin around 1 June and be completed by 15 August 1987. Installation of new fire alarm transmitters and antennas was to begin on or about 15 June 1987 and be completed by the end of the year. The new fire alarm system was scheduled to be tied into existing panels and receivers and to be started up by the end of the first week of January

1988, corresponding to the 8 January 1988 completion of the new fire station building required by the contract. (R4, tab I-C; tr. 1/144-46, 159, 230-32)

19. Kaco's progress schedule also indicated the following milestones for construction of the new fire station: installation of underground electrical piping was to start 1 June and be complete by 1 July 1987, except for the emergency generator piping; a pad-mounted transformer and the main distribution panel (MDP) "switch gear" were to be in place by the end of October; and the automatic transfer switch (ATS), the backup generator, the lightning protection system and the air handling and distribution equipment were all to be installed by mid-November 1987. Kaco's schedule did not indicate a date for completing the new fire station building, but provided for demolishing the existing fire station, and for removing asbestos, to commence during the second week of January 1988, with such demolition to be completed by mid-February 1988.[1] (R4, tab I-C)

20. Under its subcontract with Kaco, G & L was to install and make the new fire system operable. G & L planned to perform this work in two phases. Phase 1, "installation," involved installing the new radio transmitter boxes, placing plastic conduit tubes in the walls between the transmitter and the existing panel, pulling all the wire from the transmitters to the existing panels, and mounting the antennas. Phase 2, "hookup," entailed tying the system together by connecting the wires from the new transmitter boxes to the existing panels, enabling proper signals to be sent back to the receiving console in the new fire station. As originally planned, Mr. Gilliam was going to have one crew working on the new fire station while another crew was installing the alarm system. G & L's alarm system installation crew generally consisted of Jim Collier, G & L's main electrician, and one or two helpers. (R4, tab I-X; tr. 2/102-03, 108-09)

21. In late March 1987, Kaco determined that its intended radio alarm supplier, Seaboard, did not have the necessary qualifications and began considering alternate sources. On 2 April 1987, SIGCOM submitted a proposal to supply the alarm system for the price of approximately $285,000. Among other things, SIGCOM's proposal promised delivery of an initial shipment of equipment in approximately 60 days after receipt of "an acceptable order" by 8 April 1987; *i.e.*, on or about 8 June 1987. Kaco decided to discontinue dealing with Seaboard and to deal with SIGCOM as its alarm system supplier. By telegram dated 8 April 1987, Kaco authorized SIGCOM to begin work on shop drawings for the radio fire alarm system and undertook to prepare a subcontract agreement. (Ex. G-5; tr. 1/185-88; R4, tab I-H)

22. On 7 April 1987 Kaco requested the Assistant Resident Officer-in-Charge-of-Construction (AROICC) and acting project manager, Lieutenant Elizabeth Clarkson, to arrange for assigning a frequency for the wireless fire alarm system. The AROICC responded in a letter dated 15 April 1987, advising Kaco that the Government could not assign a frequency until the entire radio fire alarm equipment submittal was approved. (R4,

tabs I-R, -S) However, nothing in the contract made approval of the fire alarm equipment submittal a prerequisite for assigning an operating frequency.

23. The forty-fifth day after contract award, 9 April 1987, passed without the contracting officer having provided Kaco with a specific operating frequency for the radio alarm transmitters as required by Specification Section 16723. The timely assignment of the frequency was essential to the supplier of the radio alarm system transmitters, since the typical lead time for procuring crystals specially ground for each transmitter was 4 to 6 weeks. After the crystals were received they had to be installed in the transmitter. The transmitter then needed to be tuned properly to the assigned operating frequency and tested environmentally over the operating temperature range. The exact operating frequency also affected components for the receiver assembly found in each master console and the antenna assemblies, both of which also had a typical purchase lead time of 4 to 6 weeks. (Tr. 1/216-18, 5/135-37, 218-19; R4, tab I-H)

24. SIGCOM furnished Kaco product descriptions for its alarm system equipment and started fabricating the electronics for the system in early May 1987. Even though SIGCOM and Kaco had not settled on the final terms of their arrangement,[2] they fully expected to reach an agreement. SIGCOM continued to work on the alarm system components, but could not order radio alarm transmitters without knowing the specific assigned frequency for the system. (Tr. 1/199-201, 5/141, 144-45; ex. G-6)

25. Kaco's shop drawing submittal covering the SIGCOM radio and fire alarm equipment, Transmittal No. 8, was received by NTC on 8 May 1987. After some unexplained delay, Transmittal No. 8 was forwarded to the NAVFAC Southern Division for review. By letter dated 13 May 1987, Kaco again requested assignment of a specific operating frequency for the fire alarm radio transmitters. NAVFAC approved Transmittal No. 8 on 25 June 1987, more than six weeks after the submittal had been received by the Government. (R4, tabs I-T, -U)

26. By letter dated 30 June 1987 Lieutenant Clarkson informed Kaco that a request for frequency 164.1 MHz had been forwarded to the area frequency coordinator and that Kaco would be advised of the approved frequency as soon as possible. More than six weeks later, on Thursday, 20 August 1987, the AROICC orally informed Kaco that the 164.1 MHz operating frequency was assigned to the new fire alarm system. She confirmed this advice in a letter to Kaco dated 21 August 1987. According to Lieutenant Clarkson, it took so long to obtain a frequency because of the need to coordinate the assignment with another agency. In letters to Kaco dated 9 September and 16 November 1987 Lieutenant Clarkson acknowledged the Government's responsibility for the frequency assignment delay and invited Kaco to submit supporting justification for a time extension and/or an equitable adjustment. (R4, tabs I-Y, II-B, -C, -G; AR4, item 2 #018; tr. 4/356) After learning of the assigned frequency for the alarm system, SIGCOM ordered and completed

fabricating equipment for the fire alarm system, which was delivered to the site in several shipments.

27. Kaco submitted its shop drawings for the lightning protection system, Transmittal No. 32, at the end of June 1987. Kaco's lightning protection drawings, designated "LP-1," differed from Specification Section 16610, Paragraphs 3.1.1.2 and 3.2 and from notes on drawing sheet E-7 in three ways: (1) the copper air terminals and main conductors were depicted on the inside of the parapet walls instead of on top of the copper coping; (2) metal objects on the roof were not connected to the main conductors; and (3) conductors were shown mounted to the building roof and not below or underneath the roof deck. Kaco did not call out any variances from the contract requirements on its submittal, nor did it suggest that there was any problem with the Government's drawings or specifications for lightning protection. (R4, tabs I-A, -C, VII-A; ex. A-2; tr. 2/33-34, 42, 4/238)

28. After the architect reviewed the shop drawings, the ROICC's representative assigned action code "B" ("[a]pproved except as noted on drawings[, r]esubmission not required . . .") to the submittal, noting only the architect's comment that all metal objects on the roof had to be tied to the main conductors. The ROICC's representative had noticed an apparent variance in the submittal, showing conductors run on the side of the parapet walls instead of on top of the coping, but made no comment because he felt that industry practice would allow it. (R4, tab VII-A; tr. 2/34-35; 4/233-38, 248-49)

29. Getting permanent electrical power into the new fire station was essential to completing construction of the building. An integral feature of permanent power was installing the "oil switch," which received high voltage power coming onto the base. High voltage cable ran underground from special connectors or termination blocks at the oil switch to a transformer, which stepped down the power to a usable level that could be switched from the MDP to the various electrical systems in the fire station. From the outset of the contract in March 1987, the parties had been aware that the oil switch was to be provided by another contractor, Peerless Electric (Peerless), engaged in constructing barracks at NTC and that termination blocks for the oil switch could not be ordered until the serial number was obtained from the particular installed oil switch. The lead time for delivery of the termination blocks was at least two weeks after placing the order. The contract did not specify when the oil switch was required to be in place and its availability was the responsibility of another contractor; therefore, Kaco's bar chart schedule did not indicate a date regarding installation of the oil switch. (R4, tabs I-C, -D; AR4, item 10 #542; tr. 2/141, 4/37-38, 44, 147-50, 156-57)

30. In early September 1987, Mr. Gilliam asked Peerless when they expected to set the oil switch and learned that Peerless did not yet have one. Thereafter, Mr. Gilliam repeatedly requested Mr. Chuck Broyles, the Navy's "Construction Representative," to arrange for delivery of an oil switch. Kaco could have received and set the oil switch in

place by the beginning of October 1987, since most other electrical components, such as the MDP, did not have to be in place before the oil switch could be installed and terminated. (R4, tabs I-C, -X; tr. 1/146-47, 2/121, 262-63)

31. On or about 9 September 1987 Kaco completed the duct bank for the underground electrical piping, except for the generator piping, which was completed by mid-November 1987. Kaco's Transmittal No. 51, requesting approval of its high voltage cable, was received by the Government on 2 November 1987. Meanwhile, G & L could not mount transmitter devices because the transmitters had not yet been received. (R4, tab I-G, DRI No. 122; ex. G-21)

32. Enough of SIGCOM's radio fire alarm equipment was received on the job site by 15 November 1987 for Kaco to begin installing the system. On or about 18 November 1987 G & L began installing the fire alarm transmitters. G & L's crew proceeded to install antennas and transmitters and to pull wires between the transmitters and the existing panels. Mr. Gilliam personally installed some transmitters, but he did not install any antennas himself. (R4, tab I-F, -G; tr. 2/102, 4/71-72)

33. Kaco designated SIGCOM's military sales representative, Mr. Earley, as its manufacturer's representative to supervise installation and testing of the fire alarm system. Mr. Earley went to Orlando in November 1987 to instruct G & L's installers, (especially Messrs. Gilliam and Collier) on the system installation and operation. Among other things, Mr. Earley showed G & L personnel how to install an antenna and connect the system cable to the antenna. (Tr. 2/225, 5/150-53, 164-69)

34. SIGCOM's product literature covering antenna installation indicated, *inter alia*, that, "the antenna should be placed on the side of the building facing the main receiver and must be placed so that the top of the whip is no more than twenty (20') feet above the ground." Moreover, a note on SIGCOM's drawing styled "Surface Mounted Antenna Installation" stated that: "Antenna Ass'y Tip Must Not be Above 20'-0" Per F.C.C. Regulation." Although the drawing contained a line indicating the location of the 20 feet originating at the building pavement, it also cautioned:

> This drawing illustrates SIGCOM's typical recommended installation only. It does not reflect the requirements of any contract specification, fire standard or code. Conformance to any contract specification shall remain the sole responsibility of the installer and/or authority having jurisdiction.

Mr. Earley advised Mr. Collier and Mr. Gilliam to place the antenna on the side of the building closest to or facing the fire station, if possible, and to avoid metal buildings or, if necessary, to mount the antenna higher than the highest part of any metal building. He also pointed out that "[i]f you have either a bad antenna connection or a bad antenna location, you

will get a high reflective power." Mr. Earley stressed the importance of using a watt meter to test the reflective power of signals coming from the antennas. Nevertheless, G & L installers used only a volt-ohm meter which could measure electrical continuity to tell whether the cable had a short, but could not measure reflective power. (AR4, item 15 #s 884, 893; tr. 5/154-58, 177)

35. During installation of the alarm system, the NTC Public Works Department assigned employees to work with G & L, so that access to the fire alarm panels in each building was never a problem. The contract did not prescribe the alarm system installation details, but required contracting officer approval of the sequence of operations. However, G & L never provided the Navy an advanced schedule identifying the locations where its workers would be installing equipment. Mr. Broyles inspected Mr. Collier's installation work daily and Mr. Collier usually provided Mr. Broyles with a handwritten schedule showing the order of buildings in which G & L was planning to install equipment. Nevertheless, Mr. Collier often did not stick to his schedule and Mr. Gilliam did not always know which buildings his employees would be working in and often had to drive around and look for them. Mr. Broyles also observed some problems with the quality of G & L's transmitter installations and sometimes had to send Mr. Collier back to tighten up the fixtures or to add mounting screws. Moreover, while installing transmitters and pulling cable, G & L personnel did not check the existing panels to see if they were operating or whether the boxes contained any schematics or wiring diagrams. (Tr. 2/110-14, 4/73-74, 87, 164-65, 175-76, 5/282-83)

36. By late November 1987 Kaco's lightning protection subcontractor had roughed in the system and only the air terminals (lightning rods) and rooftop components remained to be installed. However, although Kaco's schedule indicated it would complete installing the lightning protection system by mid-November 1987, no further work was performed on the system for several months after 24 November 1987. (R4, I-G, DRI Nos. 129, 174, 176-311; tr. 1/117; AR4, item 2 #050)

37. Electrical trenching was completely back filled on or about 30 November 1987. The transformer and generator were mounted in early December and Kaco's submittal for high voltage cable was approved on 3 December 1987. (R4, tab I-G, DRI Nos. 173-79, 181)

38. The Government's approval of appellant's high voltage cable submittal included a reference to the Specification Section 16301 requirement for marking "the year of manufacture . . . on the outer surface of each cable." Kaco apparently misunderstood the prohibition in that section against "cables manufactured more than 12 months prior to date of delivery to the site," because it later requested "that the requirement for 1988 wire be waived and 1987 wire be allowed to be installed." The Navy permitted Kaco to use the 1987 cable which it acquired. We find that Kaco's misunderstanding had no effect on either the time or cost of performance. (AR4, item 2 #035; tr. 1/111; ex. G-21)

39. The main feeder cable from the transformer was pulled into the new fire station toward the end of December 1987 and high voltage cable was delivered to the site sometime in early 1988. Energizing the new fire station building was a prerequisite for completing the installation of the fire alarm transmitters and, in turn, for hooking up the new fire alarm system, activities which had been scheduled to be completed by the end of December 1987 and during the first week of January 1988, respectively. However, power could not be provided to the new fire station until the oil switch was in place. Moreover, late delivery of the oil switch also impaired Kaco's ability to install acoustical ceilings, carpet, and other humidity sensitive finish items because the air conditioning system could not function without permanent power. (R4, tabs I-G, -X; tr. 1/106, 2/181, 4/17, 36-37)

40. By letter to the AROICC dated 4 January 1988, Kaco expressed concern that the oil switch was not due on site until late February. Meanwhile, on 18 January 1988, G & L assigned three men to work on terminating the transfer switch to the MDP and, during the last week in January, 1988, Kaco's heating, ventilation and air conditioning (HVAC) subcontractor started working on refrigeration lines for the air conditioning system. (R4, tabs I-G, II-J, DRI Nos. 219-37; AR4, item 2 #036, item 10 #538; tr. 2/202, 4/46, 149)

41. The Navy found a suitable oil switch stored somewhere on the base, and it was placed on the pad at the fire station on 2 February 1988. The next day, 3 February 1988, Mr. Gilliam obtained the oil switch serial numbers and ordered the termination blocks by phone. However, Kaco did not send a written purchase order for the termination blocks until nine days later and the supplier advised that it would not ship the blocks until 3 March 1988. (AR4, item 2 #029-30, item 10 #542; R4, tab II-O; tr. 4/53-55)

42. On 5 February 1988 Kaco submitted Transmittal No. 103, for flashing and sheet metal, which showed that Kaco planned to use aluminum coping, rather than copper, on the parapet wall. The Government approved this submittal on 16 February 1988, without indicating any objection to the use of aluminum coping. In this regard, the Government's representatives felt there was adequate room on the inside of the parapet wall to mount copper air terminals and the copper main conductor without touching the aluminum coping. (SR4, tab 13; tr. 4/246)

43. On 8 February 1988, Kaco informed the Government that the fire station was substantially complete except for several items which could not be completed without a functioning air conditioning system. Nevertheless, since Kaco expected the air conditioning equipment to be installed shortly, it began installing some of the humidity sensitive, finish items. Installation of air handlers was resumed on 22 February and was completed on 24 February 1988. (AR4, item 2 #034; R4, tab I-G, DRI Nos. 204, 210, 213, 234, 237, 240-41, 261-64; tr. 5/49)

44. On 12 February 1988, the Government issued unilateral Modification No. P00003, which, among other things, extended the contract completion date for Phase A by three days, to 11 January 1988, for reasons not relevant to this appeal. (R4, tab I-E)

45. The barracks contractor, Peerless, activated the oil switch on 29 February 1988. The oil switch termination blocks were received by Kaco on 14 March 1987, however, the shipment arrived with several incorrect parts. The proper parts were received on 16 March and tie-in to the MDP was begun that day. The high voltage cable test was scheduled for 18 March 1988, but was canceled because of high humidity. G & L completed making high voltage terminations at the oil switch on 22 March and the new fire station was energized on 23 March 1988. (R4, tabs I-F, -G, II-R, DRI Nos. 254 258; tr. 2/143; AR4, item 10 #542-44)

46. In 23 March 1988, Kaco had completed pulling wire and placing antennas and transmitters in the buildings at NTC that were to receive the new radio controlled alarm system and began preparing to test its installed equipment. By letter to the AROICC dated 23 March l988, Kaco advised the Navy that the SIGCOM representative, Mr. Earley, would arrive on site on 4 April to begin the "fire alarm checkout" and that they would begin "bringing on line the fire alarm transmitters" on 5 April 1988. The contemplated checkout involved hooking the base receiver into the new fire station building, connecting the transmitter wires to the existing alarm panels in each building, one building at a time, and testing the receipt of signals from each building at the base receiver. Kaco believed that it could complete this entire operation in about three weeks. The Navy's 24 March acknowledgment of the foregoing notification also requested Kaco to advise how it planned to meet the specification requirement for continuous operation of the fire alarm system during testing, to provide a schedule of buildings to be brought on line for testing, and to submit as-built drawings and required manuals prior to final testing. (R4, Binder D at 162; *id*. tab III-J; AR4, item 9 #s 460, 463)

47. The HVAC subcontractor tied ductwork into the air conditioning units on 24 March 1988 and the air conditioning units were started and placed in service on 28 March 1988, five days after the building was energized. However, the air conditioning units had not yet passed the air flow tests required by the contract. (R4, tab I-G, DRI Nos. 240-41, 262, 264)

48. During March 1988 the parties disagreed over whether the contract required Kaco to provide topsoil and sod, instead of grass seed, around the new fire station. After Kaco seeded and mulched the area, the Navy directed it to install sod. Kaco installed the sod under protest on or about 31 March 1988. (R4, tab VIII-B; tr. 1/132-33)

49. Between 11 and 12 April 1988, Mr. Earley made a final hook-up of the base receiver in the new fire house and ran a successful test on the alarm system installation in Building 304. On 13 April, Mr. Earley instructed NTC fire department personnel on the

operation and use of the base receiver. The NTC Fire Chief, Bruce Davis, assured Kaco that firemen would man the console in the new facility prior to BOD so that the switch-over could commence. (AR4, item 9 #463)

50. However, the contracting officer would not permit Kaco to proceed with hookups to bring any buildings on line and to test signals from any building to the base receiver until the new fire station was ready for beneficial occupancy. By letter dated 14 April 1988, Commander Patrick Cahill, the ROICC and contracting officer, advised Kaco:

> In order to provide fire alarm protection to all buildings during the hook-up/turn-over process, the Navy fire department must maintain a 24-hour fire watch in each building. . . . Naturally, the new fire station building must be fully habitable (i.e. BOD) by the final day of the new radio fire alarm system turn over inasmuch as the buildings will all be on the new alarm system.
>
> . . . Some of the major items listed to be complete by 15 April which are not yet complete are:
>
> 1. lightning protection system
>
> 2. transfer switch (operational tests)
>
> 3. generator (operational tests). . .
>
> . . . . While many of these items can be accomplished during the turn-over period, several must be completed before a 24-hour fire watch can be set. These include items 1, 2, and 3 above.

The need for "the new fire station building [to] be fully habitable (i.e. [ready for beneficial occupancy]) by the **final** day of the new . . . alarm system turn over" was obvious. Nevertheless, the ROICC refused to permit NTC fire personnel to stand watch at the new facility and in other buildings to facilitate the planned switch-over, ostensibly because of his concern with the risk of losing monitoring capability if lightning struck the site and knocked out the receiving console. Moreover, the ROICC also refused Kaco's request to put a console in the old fire station to check out the switch-over from there. However, we find that other occupied buildings at NTC, including the existing fire station and the ROICC's office, did not have lightning protection systems. We also find, as conceded by the ROICC, that the contract contained no requirement for substantial completion or beneficial occupancy of the new fire station while new transmitters in other buildings were being connected to existing alarm panels and did not preclude testing of the base receiver

and checking out of signals from each building prior to final turnover of complete new alarm system. (AR4, item 2, #085, item 9 #463; R4, tab I-G, DRI No. 274, tab III-J; tr. 5/67-69; 83)

51. By 20 April 1988 Kaco had completed operational tests for the transfer switch and generator. The lightning protection system remained as the only uncompleted "major" item listed in the ROICC's letter. However, by that date Kaco identified 14 buildings with various problems in the existing fire alarm panels and cautioned the that these problems might cause delays during the hookup phase. (R4, tabs I-G, III-L, IV-G, -M, -N; tr. 3/112, 5/63-66; 83)

52. On 27 April 1988, representatives from Kaco and the Government reviewed Kaco's lightning protection shop drawings and the Government pointed out variances that had not been indicated on the shop drawings (R4, I-G, DRI No. 286, 287). The Navy indicated that it would consider a variance in the method of installation provided Kaco made a new submittal noting the proposed variances. Kaco's project manager responded in part:

> . . . even though the original submittal shows for all the lightning conductors to be run on top of the roof and was approved, I will resubmit with "variance" exposing the changes from the original drawing. The system submitted and approved is vastly different from the one specified, and I question why the Engineer approved with no comments at all. He must have reviewed it closely and found no exceptions with the design.

(R4, tab VII-D, -E)

53. By mid-May 1988 Kaco completed installing the aluminum coping which it had started to place on 22 April. The delay in completion was due to a deficiency in the caulking sealant it used at the coping joints, which was corrected only after Kaco submitted new shop drawings for the material. (R4, tabs I-F, -G; SR4, tab 13; tr. 5/83)

54. The parties disagreed over the design for lightning protection system. Among other things, Kaco alleged that the Government's drawing for the system, sheet E-7, did not meet UL requirements and necessitated creation of the contractor's own drawings included in Transmittal No. 32. By contrast, in a 9 May 1988 letter to the architect, VOA, Mr. Millward opined that there was no problem with the Government's lighting protection design. By letter dated 16 May 1988, the Government directed Kaco either to (1) install lightning protection as shown in original contract drawing E-7 or (2) install the lighting protection system described in Kaco's shop drawings, after identifying and obtaining approval for variances. In a reply dated 23 May 1988, Kaco restated its view that the Navy's lightning protection design violated UL requirements and that that there was nothing wrong with its original submittals because the contract specifications for lightning protection

were performance specifications. (R4, tabs VII-E, -F, -G, -O; SR4, tab 3; AR4, item 2 #057; tr. 2/40-41, 5/105-08)

55. During the course of the disagreement over lightning protection design, Kaco submitted revised lightning protection system shop drawings, Transmittal No. 32A, which was received by the Government on or about 16 May 1988. Among other things, the new submittal highlighted the following five variances from contract drawing E-7:

(1) aluminum conductors were to be used instead of copper,

(2) coursing of the conductors was now on top of the parapet,

(3) conductors would run on top of the membrane of the roof,

(4) A150 aluminum flat plates instead of bronze plates would be used for connecting the conductors,

(5) "through-roof" conductors would go through the roof instead of the through the parapet.

Kaco's revised drawings were approved on 24 May 1988, with no suggested changes, and Kaco started installing the lightning protection system on 31 May 1988. As reflected in a letter to Kaco dated 31 May 1988, the ROICC agreed to proceed with Kaco's lightning protection design and indicated that this work would be treated as a compensable change "[s]hould Kaco be able to prove that the original design was not certifiable," otherwise Kaco's "alternative design will be treated as a no-cost field change." Drawing sheet E-7 was reviewed by independent engineers, who found that the Government's lightning protection system design did not satisfy UL and NFPA requirements with respect to the number and spacing of air terminals, the connection of down conductors, and interconnection of grounding media. (AR4, item 2 #061, 068-69; tr. 2/38; R4, tab VII-X; ex. A-3)

56. On 7 June 1988 Kaco requested the AROICC to schedule inspection of the lightning protection system. On 15 June 1988, after a postponement for inclement weather and resolution of some punchlist items, the Government approved Kaco's lightning protection system and treated that date as the beneficial occupancy date. (R4, tabs I-G, DRI Nos. 311-318; III-A, -R, -S, -V; tr. 5/23; app. supp. R4, tab 2-B)

57. In mid-June 1988, Millward Engineering suggested that an air-flow defect in the HVAC system was caused by a 45° "elbow" in the ductwork which was placed too close to the fan. Millward recommended reducing the bend in accordance with a sketch they developed. The Navy directed Kaco to change the ductwork according to the Millward sketch. Kaco complied with this direction under protest. (R4, tabs VIII-E, -J, -K, -L, -M)

58. Kaco's electrical subcontractor, G & L, began the hookup phase of the fire alarm system installation on 18 June 1988. Mr. Gilliam provided the ROICC with a list of buildings that G & L would be working on each day. Mr. Gilliam had estimated that hooking up would take one hour per building. Mr. Gilliam was not at the fire station project on a daily basis during this phase and did not do any hookups himself until after Mr. Collier left sometime near the end of the project. (R4, tab I-G, DRI No. 319, AR4, item 2 #198, item 9 #s 467, 480; tr. 2/105, 217, 4/74-78, 5/282)

59. As soon as it began hooking up the system, G & L discovered that many panels either were not operating properly or were not operating at all. During the first two weeks of hookups, 15 of 60 panels could not be put on line because of various problems. At least four panels were empty boxes with all electronics removed. Mr. Broyles confirmed that most of the problems were encountered with the older alarm panels. Lieutenant Clarkson described the condition of the existing panels prior to the project as "medium to poor." (Tr. 2/114-15, 150-51, 187, 189, 4/186, 364; AR4, item 2 #188; R4, tab IV-W)

60. When G & L encountered unanticipated conditions in the existing panels, it had to refer to schematics in order to wire the new system. However, the schematics were not found in some of the panels. On 30 June 1988, G & L was given keys to the public works file cabinets for access to schematics. Mr. Broyles estimated that about 72 percent of the panels had schematics in them and for many of the others, the schematics were available at the Public Works office. In a 5 July 1988 letter to Kaco, the AROICC stated "over half of the panels have diagrams or drawings inside the panel door." By contrast, Kaco responded that they had so far opened 58 panels and not one had diagrams. We attach no weight to this response, since it is inconsistent with an apparently contemporaneous, undated list of buildings compiled by Mr. Gilliam of G & L showing only seven out of 117 listed buildings as having missing schematics. Nevertheless, while the schematics for some of the panels were available at the Public Works office, others could not be obtained because they had been destroyed by insects or had been taken and not returned.[3] This situation made it necessary for G & L to order schematics from manufacturers, when possible. However, sometimes the manufacturer was no longer in business or would not provide schematics. (R4, tabs I-G, IV-M, -N, -O, -P; AR4, item 2 #s 091-97, 107, 120, 141; tr. 2/113, 154-55, 158-62, 197-98, 236-37, 246-48, 4/158-59, 186)

61. The Navy had not determined whether the existing panels were in working condition prior to soliciting bids for the project. Fire Chief Davis testified that all existing fire alarm panels worked prior to February 1987 and that Public Works personnel continued inspecting the alarm system and the alarm panels in each building during installation of the new radio fire alarm system. We do not find the foregoing testimony persuasive. Among other things, no record of the alleged inspections during the installation period was ever produced. (Tr. 1/309, 4/203, 215, 217-18, 222)

62. G & L also experienced difficulty gaining access to mechanical rooms where fire alarm panels were located while conducting hookups during late June and early July 1988. As documented in daily reports, with which Mr. Broyles agreed, G & L had no access to mechanical rooms in certain listed buildings because keys were not available. On those occasions, G & L installers had to search for Government representatives to open the mechanical rooms. Mr. Broyles confirmed that, during the June and July 1988 time frame, Public Works department inspectors and fire alarm technicians were "under orders" to give no gratuitous help to G & L in troubleshooting problems encountered with the hookups. Mr. Broyles observed that the ROICC's assistance on the project was limited only to providing keys and factory diagrams, where available, and determining whether the installed wiring was correct and whether the installed system was working. (R4, tab I-G, DRI Nos. 323-24, 327-28, 330; AR4, item 2 #s 184-85; tr. 4/179, 194-96)

63. On 7 July 1988, Mr. Gilliam provided Kaco with a listing of 15 buildings, (in addition to the 14 buildings listed in Kaco's 20 April 1988 letter) where G & L could not perform hookups for such reasons as: no keys to mechanical rooms where panels were located, no schematics and inoperable panels (in some of which the inside wiring was totally missing). The Government admitted that six of these buildings had panels out of service and Mr. Earley observed that "[t]here are a lot of panels on this facility that need [to be] replaced." (AR4, item 2, #s 179, 184; R4, tabs IV-V, V-D)

64. G & L experienced many of the foregoing problems (*e.g*., access to mechanical rooms, inoperable alarm panels, missing schematics, etc.) sporadically throughout the hookup phase. (AR4, item 2 #s 092-137) However, G & L did not document most of the problems it encountered hooking up the installed fire alarm system after July 1988. Moreover, the record contains no DRIs submitted by Kaco after 11 July 1988.

65. The existing hard wired alarm system could carry an alarm signal to the fire station from each building's fire alarm panel, however, it could not send a "trouble" signal from each panel to the fire station. Instead, certain (but not all) alarm panels could indicate trouble locally; *i.e*., a light, a bell or a buzzer would go off in the building indicating the battery was dead, or that a short had occurred, or that the panel had been tampered with. One type of alarm panel was the "coded wheel" type. The coded wheel panels were specifically addressed in Note 9 to drawing FP-1 and required the addition of a relay to enable them to provide an alarm signal. (Kaco furnished the relays and G & L included in its bid the labor costs to install the alarm relays on the coded wheel panels.) (Tr. 2/167; 250-52; AR4, item 9 #472)

66. In addition to the coded wheel type panel, the hard-wired system had included three other types of alarm panels: (1) those with "end-of-line" circuits, which could signal trouble locally and which also had contacts to allow ready hookup to the new radio transmitters in order to send trouble signals to the fire station; (2) those with end-of-line

circuits that could indicate trouble locally, but which needed an added relay in order to send trouble signals to the fire station; and (3) those without any end-of-line circuits, which could not indicate trouble locally, and would never be able to send trouble signals without being reworked to include end-of-line circuits. Mr. Bolton acknowledged that approximately six panels were of the later type and, as identified by Kaco, could "not provide a trouble signal because of missing or out of date parts . . . ." Although, the FP drawings did not indicate that any panels were lacking end-of-line circuits and nothing in the contract plans described where relays were necessary to make existing panels communicate trouble, the contract contemplated that, once the new alarm system was hooked up, existing panels that had been able to indicate trouble locally would be able to send the trouble signal to the fire station. (Tr. 2/163, 166, 4/269-75, 342, 5/129-31; R4, tab I-C (§ 16723 ¶s1.3, ¶2.1.9); AR4, item 2 #102)

67. The Government gave Kaco inconsistent directions concerning the need for installing connections or relays for transmitting trouble signals to the new fire house. Initially, in reply to Kaco's 1 August 1988 request for information (RFI) asking how the Navy "want[ed] the trouble indication connected" in those cases "when no aux. trbl. contacts are provided in the existing panel," Lieutenant Clarkson advised: "[I]f there is no aux trouble in the existing fire alarm panel - no connections are necessary." Kaco's RFI had referred only to the panels with no end-of-line circuit and that were unable to indicate trouble locally and its installer proceeded in accordance with Lieutenant Clarkson advice. In January 1989 the Navy directed Kaco to provide and install relays and contacts to indicate trouble in all remaining buildings. Under protest, Kaco purchased and installed relays for the buildings with panels that did not have any capability to signal trouble. We find that "the procedure of adding trouble relays . . . to a fire alarm panel [which cannot otherwise signal trouble] is a lengthy and involved one requiring the alteration of various electronic components in the circuitry." For example, one of the panel manufacturers, Simplex, recommended to G & L that this alteration "be performed by a manufacturer's trained technician" and offered to make the changes at the rate of $275 per panel. (AR4, item 2 #s 104, 107, 125, 148, 152, item 8 #s 408-34; R4, tabs I-H, V-D; tr. 2/152, 167-69, 4/169-70, 327, 347)

68. Not all problems encountered by G & L while attempting to hook up the fire alarm system (findings 60-65) were without its fault. Many of these problems resulted from G & L's lack of know-how and experience. In June 1988, Mr. Mark Bolton, Fire Protection Engineer for NAVFAC's Southern Division, visited NTC and observed Mr. Collier attempt to hook a transmitter up to a relatively new, "Simplex" panel and found that Mr. Collier was unable to identify where the radio transmitter should be connected. Mr. Bolton observed Mr. Collier's hookup work in several more buildings and concluded that Mr. Collier needed expert supervision. Mr. Collier admitted to Mr. Bolton that he had never before performed this type of hookup. Mr. Broyles testified that Mr. Collier appeared to be adrift during the hookup phase and described Mr. Collier's hookups as "not a good high standard," and we so find. (Tr. 4/178, 192-95, 207-09, 263, 280-85)

69. Concerned that G & L was not hooking up the system properly, on 4 August 1988 the Navy directed Kaco to "provide a manufacturer's representative to supervise the method of connecting the new fire alarm system into existing building panels." The SIGCOM representative, Mr. Earley, had visited NTC during installation of the system's transmitters and antennas and later had numerous telephone conversations with Mr. Collier and Mr. Gilliam about different problems they were encountering hooking up the new system. Most of those conversations had involved problems G & L was having in locating contacts on existing fire alarm control panels, reception problems, and making trouble signal transmissions work. On 4 August 1988, Kaco requested Mr. Earley to make another trip to NTC and informed the Navy that, since it had not anticipated needing this additional consulting effort, it expected to submit a claim for Mr. Earley's time. (AR4, item 2 #s 174, 176; tr. 1/129, 5/170-71, 196-97; ex. G-8)

70. During August 1988 Mr. Earley investigated the new system installation and discovered, *inter alia*, that: the G & L installers had not soldered the coaxial cable on a number of antennas; several antenna mounts were not watertight because the installers had not placed the antenna all the way down into the mounting tube and had not installed the antenna mounting clamps; and, as acknowledged by Mr. Gilliam, many circuits were wired incorrectly, resulting in (a) bell circuits that were not signaling on the local fire alarm control panel, (b) panels that would not send a fire alarm to the new fire station, and (c) trouble signals that would indicate a fire alarm instead of a trouble signal. We find, as observed by Mr. Earley, that: "[t]he coaxial cable connections in regards to the antenna . . . were poorly soldered and very poorly installed [and that t]he wiring to some of the trouble contacts and some of the alarm contacts were very poorly installed." (AR4, item 13 #786; tr. 5/175-79, 195, 270, 285)

71. During the second week of September 1988, NTC fire department personnel tested fire alarms in 120 buildings and created a punch list based on those tests. Discrepancies mentioned on the punch list included: transmitting trouble signals instead of master alarm indication, and *vice versa*; alarm codes identifying the wrong building at the fire station control panel; transmitters out of service; transmitting signals after being reset; battery and relay problems; old hard-wired transmitters still connected to the system; inaudible signals; signals not received at the fire station; and ground faults. During three full days between 14 and 18 October 1988, Mr. Collier worked on correcting the foregoing discrepancies in most of the listed buildings. However, 14 of the buildings listed as needing corrections actually had no problems and G & L sent Kaco a claim for the time and cost spent checking out these buildings. (R4, tab I-H; AR4, item 2 #s 155-64, item 9 #475; tr. 2/214-16)

72. Kaco completed hooking up the equipment in late October 1988 and requested a final inspection of the fire alarm system. The requested inspection was conducted on or about 31 October 1988 and Mr. Bolton was present during the inspection. After about a quarter of the buildings were inspected, the system was determined to be unfit

and not ready for final acceptance. Unrebutted evidence shows that Kaco (and its subcontractor, G & L) encountered numerous problems making connections between the existing panels and the new transmitters. Examples of these problems included: inoperable zones, where no alarm was sent to the fire station; loose relays; improper connections of stranded wire; and panels from which trouble signals could not be transmitted. Moreover, many antennas were mounted improperly. Some antennas were mounted below roof height, although specified to be at roof height. Some antennas brackets were screwed into the drip edge of flashing instead of solidly into the building. Other antenna installations exhibited missing mounting brackets and missing water seals. According to Mr. Bolton, the foregoing problems were encountered "across the board" in all the buildings inspected. (R4 tabs I-D, V-I; tr. 2/169-70, 4/287-91)

73. The inspection also disclosed that Kaco had proceeded with the work without producing any as-built drawings. Kaco did not keep good records of what it had and had not done. As-built drawings for the fire alarm system had to be produced by going back to each building and reevaluating what had been done. (R4, tab V-K; tr. 4/291-95)

74. G & L's Mr. Gilliam complained that he was given conflicting instructions from the Government, Kaco and SIGCOM about the mounting and proper height of the antennas. He claimed to have initially followed SIGCOM's product literature (the "cutsheet" instructions and accompanying drawing), which he interpreted to mean that antennas could be no more than 20 feet above the ground, but he did not inquire about the F.C.C. Regulations referred to in SIGCOM's literature nor attempt to reconcile the literature with express contract requirements. G & L eventually relocated antennas on several buildings and, among other things, rented a bucket truck to work above 20 feet. According G & L, it did not include the cost of a bucket truck in its bid because Mr. Gilliam thought that none of the antennas would be installed above 20 feet. (AR4, item 2 #s108, 124; R4, tab I-H; tr. 4/7-8, 11, 63-64, 71)

75. On 1 November 1988, Kaco's asbestos removal subcontractor, ESSI, withdrew its $4,320 May 1987 proposal because the proposal was out of date. On 7 November 1988, Kaco issued a purchase order to EESI, in the amount of $6,138, for asbestos removal and disposal. Asbestos removal was completed in December 1988. (R4, tabs I-H, VIII-U, -V, -W; see note 1)

76. On 30 January 1989, the Government conducted a second final inspection of the fire alarm system and again the system was unacceptable. Observers present at the inspection included Mr. Earley, Mr. Bolton, and Mr. Gilliam. This second inspection disclosed that many of the problems that had been detected during September 1988, especially those related to antenna installation, had still not been corrected. Among other things, many transmissions were not being received clearly at the new fire station. (R4, tab V-S; AR4, item 10 #638; tr. 2/175-77; ex. G-10, -18)

77. In a letter to Kaco dated 10 February 1989, the Navy listed 23 buildings that were not transmitting trouble signals. The letter cautioned the contractor that "[o]nly in the case where the manufacturer will certify the equipment cannot be configured to report a trouble or certify parts are no longer available, can this requirement be waived." (R4, tab V-S)

78. On 16 March 1989, the contracting officer executed and mailed to Kaco unilateral Modification No. A00007, extending the completion date for Phase A of the contract an additional 156 days, to 15 June 1988 (the specified 21 February 1988 Phase B completion date remained unchanged). In the supporting price negotiation memorandum of 15 March 1989 the contracting officer attributed 133 days to the "Government delay in providing frequency assignment for radio fire alarm system" and determined that the delay in providing the oil switch was 23 days. Modification No. A00007 also invited the contractor to furnish, within 30 days after receipt, "a written statement setting forth the general nature and monetary extent" of any claims associated with these delays.[4] (R4, tab I-E)

79. Around 4 April 1989, the Government sent Kaco a proposed "Supplemental Agreement to definitize Modification 00007/Unilateral." Kaco did not sign the proposed modification. Instead, on 14 April 1989, Kaco submitted a claim for an equitable adjustment in the amount of $536,261 and a time extension of 474 days. (R4, tab I-E)

80. The constructive suspension of work portion of Kaco's claim asserted a 474-day compensable Government-caused delay. In calculating this delay, Kaco alleged 153 days for the delayed assignment of a fire alarm frequency, 121 days for the oil switch delay, 71 days for the BOD requirement due to delayed lightning protection, 319 days for the fire alarm connections, and 495 days for testing and adjusting the fire alarm system. Kaco concluded that "[b]ecause of concurrencies, 474 days is the base for damages." Kaco calculated the 474 days from 11 January 1988 (the Phase A completion date established by Modification No. P00003) to 1 May 1989 (when Kaco predicted the contract would actually be completed). (R4, tab I-H)

81. The preponderance of Kaco's claimed monetary adjustment represents damages resulting from the alleged compensable delays. In addition Kaco claimed the following adjustments based on alleged constructive changes: $1,821 for providing sod; $1,479 for Government ordered changes to air conditioning duct work; $2,172 for asbestos removal; and $13,268 for extra services rendered by Mr. Earley. Finally, Kaco's claim contained its subcontractor G & L's more than $68,000 claim (plus Kaco markups) for extra labor, equipment, and overhead costs incurred due to: the frequency delay; the oil switch delay; the imposition of the BOD requirement, which delayed testing the fire alarm system installation and the hookup of the base receiver in the new fire house; missing panel schematics; adding 18 extra alarm relays not called for in the specifications; checking out inaccurate punch list items; repairing malfunctioning existing panels; renting a bucket truck

and relocating antennas; additional work to transmit trouble signals; and "Cost of Relays Not Inc. in G & L bid." (R4, tab I-H)

82. On 25 April 1989, Kaco compiled a list of several buildings in which panels were unable to transmit trouble signals, even though the drawings indicated that they would. Among other things, the list indicated: "Buildings 306, 246 and 602: These buildings have the Simplex 2001 panels which we are unable to tie into." (AR4, item 2 #119)

83. The fire alarm system was tested again 25 April 1989. Kaco corrected several punch list items after the test. The system was accepted on 23 May 1989. (R4, tab III-D; AR4, item 2 #s003, 101) The record contains hardly any evidence pertaining to the demolition of the existing fire station under Phase B of the contract, other than the completion date therefor remaining unchanged and that asbestos removal was accomplished in December 1988.

84. Kaco's 14 April 1989 claim was not properly certified. Appellant resubmitted the substantially identical claim, properly certified, on 11 January 1993, and the contracting officer issued a final decision on the claim on 20 May 1993. The contracting officer's decision granted Kaco total time extensions of 156 days and additional compensation of $39,937.56 for the "combined effects of the frequency assignment and oil switch delays" and denied all other element's of the claim. In addition, the contracting officer's decision assessed liquidated damages in the amount of $7,200.00 (32 calendar days at $225 per day) based on the following rationale:

> Although the Government took partial use and possession of the Phase A work, specifically the fire station building on June 15, 1988, connection of the new fire alarm system, also a part of the Phase A work, was not completed until July 17, 1988. Liquidated damages are there[fore] assessed at $225.00 per day from June 15, 1988, to July 17, 1988, or 32 calendar days. The total liquidated damages assessment is therefore $7,200.00.

The decision offset the foregoing Government liquidated damages claim from the equitable adjustment granted therein, providing Kaco a net compensation of $32,737.56. (SR4, tabs 1, 2) Kaco timely appealed. Other than the quoted statement in the contracting officer's decision concerning liquidated damages, the record contains no evidence suggesting that Kaco satisfactorily completed "connection of the new fire alarm system . . . [anytime on or before] July 17, 1988."

DECISION

A. Preliminary Matter

Less than one week before the hearing, the Government filed a "Motion to Dismiss for Lack of Jurisdiction." The motion was based on the Government's having recently learned that Kaco's status as a Florida corporation "was administratively dissolved" by the State of Florida sometime **after** Kaco filed its notice of appeal and complaint in this action. Rather than seeking outright dismissal of the appeal, the motion, in the first instance, seeks simply to require Kaco "to affirmatively show that it has legal existence and capacity as a corporation under Florida law" as a condition for prosecuting this appeal. (Mot. at 1, 4) Appellant opposed the motion and also arranged for its reinstatement as a Florida corporation four days before the hearing. Pursuant to Board Rule 5(a), the Board deferred decision on the motion until after the hearing on the motion and merits.

Acknowledging that the capacity of a corporation to maintain an action is determined by the law of the state under which it was organized, the Government cites and quotes from "[w]hat appears [sic] to be the [relevant] present statutes" from the Florida Business Corporation Act, Fla. Stat. Ann. §§ 607.1405 and 607.1421 (1993), but contends that these provisions "do not provide clear answers to the capacity situation." (Mot. at 3-5) However, as noted by the Government, § 607.1421, **Procedure for and effect of administrative dissolution**, provides in part:

> (3) A corporation administratively dissolved continues its corporate existence but may not carry on any business except that necessary to wind up and liquidate its business and affairs under § 607.1405 and notify claimants under § 607.1406.

In turn, § 607.1405, **Effect of dissolution**, provides in part:

> (1) A dissolved corporation continues its corporate existence but may not carry on any business except that appropriate to wind up and liquidate its business and affairs, including:
>
> (a) Collecting its assets;
>
> * * *
>
> and (e) Doing every other act necessary to wind up and liquidate its business and affairs.
>
> (2) Dissolution of a corporation does not:
>
> * * *
>
> (e) Prevent commencement of a proceeding by or against the corporation in its corporate name; [or]

(f) Abate or suspend a proceeding pending by or against the corporation on the effective date of dissolution . . .

The foregoing provisions, especially § 607.1405(2)(f), demonstrate Kaco's capacity to prosecute this appeal. We deny the motion.

B. On the Merits

Kaco's claim revolves mainly around its contention that various Government acts and omissions caused delays to completion of the contract work for which it is entitled to compensation. The principal alleged Government caused delays "to critical items" involved: (1) failure to assign a frequency for the radio-controlled fire alarm system when required; (2) failure timely to supply an oil switch; (3) imposing a requirement for beneficial occupancy "prior to beginning switchovers to the new fire alarm system"; and (4) failure to disclose the condition of the existing fire alarm panels or, alternatively, failure to assure that the panels worked properly in addition to failure to cooperate during the hookup phase of the project. (App. br. at 1)

Under the April 1984 Suspension of Work clause in Kaco's contract, any Government contract administration act or "failure to act within the time specified in th[e] contract" which causes "performance of all or any part of the work . . . [to be] suspended, delayed, or interrupted" for an unreasonable period of time gives rise to an adjustment "for any increase in the cost of performance (excluding profit) necessarily caused by the unreasonable suspension, delay, or interruption." However, no adjustment is available under this clause "for any suspension, delay, or interruption to the extent that performance would have been so suspended, delayed or interrupted by any other cause, including the fault or negligence of the Contractor." FAR 52.212-12 (redesignated in 1995 as 52.242-14).

According to appellant, "the contract took 474 days longer to complete than scheduled and resulted in a multitude of additional costs to Kaco." (App. br. at 2) The 474-day "base for damages" claimed by Kaco consumes the entire period from the scheduled Phase A completion date until the date appellant predicted that the contract was would be completed. (Finding 80)

Measurement of the total alleged delays and their actual effect on contract performance is hampered by the absence from the record of any reliable critical path analysis, either contemporaneous or after-the-fact.[5] The only credible evidence in the record tending reasonably to show Kaco's planned performance, including the number of days it anticipated needing to perform particular elements of the work, was Kaco's approved progress schedule. However, this schedule was only a bar chart and did not include either a network analysis or a critical path plan. (Finding 18)

Precise determination of the impact of delays on final contract completion is also impeded by the paucity of evidence concerning performance of the Phase B demolition work. (See finding 84) However, since the parties focused only on the performance and scheduled completion of Phase A work, their apparent disregard of the demolition effort does not preclude our using the Phase A schedule for determining numbers of days of delay in connection with both appellant's compensable delay claim and the Government's liquidated damages claim.

Phase A of the contract involved two distinct activities, each to be completed by 11 January 1988: (1) construction of a new fire station building and (2) installation of a new radio controlled fire alarm system over an existing hard-wired alarm system throughout the NTC. Performance of these separate activities was, for the most part, independent of each other, except at the point when the new radio alarm system was connected to the new fire station. Therefore, it is possible to measure the impact of delays or other interruptions affecting only one of the activities without having to determine their effect on the other activity. This is particularly true with respect to the first two delays claimed by Kaco: the delay in assigning an operating frequency and the delay in providing the oil switch.

1. Operating Frequency Assignment. The supplier of equipment for the radio controlled fire alarm system had to know the exact operating frequency of the system in order to procure specially ground crystals for each transmitter and to fabricate other system components. The contractor's ability to begin installing the alarm system depended, in the first instance, on shipment of these components to the project site by its equipment supplier. Specification section 16723 of the contract required the contracting officer to direct the contractor as to the specific operating frequency assigned for the system "within 45 days after contract" award, *i.e.*, by 9 April 1987. It is undisputed that the Government failed to inform the contractor of the assigned operating frequency until 20 August 1987, 133 days later than "the time specified in th[e] contract," and did not confirm this notification in writing until the following day. (Findings 10b, 22, 26) The delay in assigning the frequency for the alarm system was wholly the Government's responsibility and was beyond the control and without the fault or negligence of the contractor.

During negotiations for what eventually resulted in unilateral Modification No. A00007, the Government admitted liability for 133 days for its delay in assigning the operating frequency for the fire alarm system. These 133 days correspond to the number of days between the date when the contracting officer was required to assign the frequency and the date when the AROICC actually notified Kaco of the frequency assignment. (Findings 26, 78) However, the number of days during which the Government fails to perform a required act is not, in itself, determinative of the delay to "the performance of all or any part of the work" resulting therefrom. Instead, the proper measure of the delay to which the Government is admittedly liable is to determine that part of the contract work necessarily affected by the "unreasonable delay, suspension, or interruption."

The record in this case shows that Kaco expected to receive the first shipment of fire alarm equipment by 1 June 1987 and planned to begin installing new fire alarm transmitters and antennas (a critical first step toward completing the overall system installation) on or about 15 June 1987. Kaco did not receive enough fire alarm equipment at the site to permit starting installing the system until 15 November 1987. This 153-day delay in starting the alarm system installation corresponds to the frequency assignment delay calculated by Kaco in its claim. (Findings 18, 32, 80)

The Government contends that the contracting officer's failure to assign a frequency within the time specified did not delay Kaco's performance by as many days as claimed. According to the Government, even if the frequency had been assigned by 9 April 1987 as required, Kaco would have been unprepared to order the fire alarm equipment because it did not have a firm supply agreement with its wireless fire alarm equipment supplier, SIGCOM, until sometime after the promised 8 June 1987 initial shipment date. The argument focuses on the details of finalizing Kaco's formal contractual arrangement with SIGCOM, and ignores the fact that Kaco authorized SIGCOM to prepare shop drawings for the alarm system on 8 April 1987 and on the work actually performed by SIGCOM in April and May 1987, even without a formal agreement. (Gov't br. at 71-75; findings 21, 24, note 2) The Government's argument lacks merit. The Government's duty to assign a frequency was not conditioned on either a firm contractual commitment with a fire alarm equipment supplier nor submission and approval of shop drawings for the system. To the contrary, the Government's failure to discharge its duty to assign an operating frequency for the alarm system prevented SIGCOM from ordering transmitters for the system, an item which required a 4 to 6 week lead time. (Findings 22-24) We conclude that the delay Kaco encountered in receiving enough alarm system equipment to begin installing the system was caused solely by the Government's failure to assign the operating frequency within the specified time and that appellant is entitled to a time extension and compensation for 153 days of delay.

2. Oil Switch. Providing permanent power to the new fire station building was a prerequisite to completing construction of the building and completing hooking the newly installed alarm system into receivers in the new fire station. Permanent power could not be provided until the oil switch was in place. Although this equipment was to be provided by another contractor and was not called out specifically in Kaco's progress schedule, the parties had expected the oil switch to be available at the site by late September or early October 1987. Moreover, termination blocks for the oil switch, needed for connecting cable from the switch to the transformer, could not be ordered until the serial number was obtained from the oil switch actually in place and necessitated several additional weeks of lead time for their delivery. (Findings 16, 19, 29, 30, 39)

The barracks construction contractor, Peerless, never actually provided the oil switch. Instead, the Navy itself located a suitable oil switch on the base and placed it on the pad at the fire station on 2 February 1988 and Peerless activated the oil switch on

29 February 1988. The delay in making the oil switch available was the Government's responsibility and was without Kaco's fault or negligence. (Findings 30, 41, 45, 78)

Kaco claims late delivery of the oil switch delayed its performance by 121 days. This four-month delay was calculated from 22 November 1987, when Kaco had planned to have permanent power in place, to on or about 23 March 1988, when the fire station was actually energized. (Findings 30, 45, 80; app. br. at 7-9)

Appellant bears the burden of proving the extent of the performance delay "necessarily caused by the unreasonable suspension, delay, or interruption" for which the Government is responsible. The record does not support finding the Government responsible for the entire 121-day delay claimed by Kaco. Among other things, Kaco was not ready to energize the building by mid-November as planned. The transformer and generator were not mounted until early December 1987 and high voltage cable was not delivered to the site until sometime in early 1988. Even after the oil switch was placed on the pad at the fire station on 2 February 1988, Kaco did not receive the oil switch termination blocks with correct parts until 16 March 1988. Apart from the normal lead time for shipment of the termination blocks, the Government was not responsible for such other delays Kaco encountered in receiving blocks with correct parts as: Kaco's failure to send a purchase order for 10 days after the oil switch was received; initial delivery of the blocks more than ten days later than promised by the supplier's factory, and initial shipment of incorrect parts. (Findings 37, 39, 45) Nevertheless, the record before us permit a fair determination of the extent of the oil switch delay.

Unilateral Modification No. A00007 granted Kaco a 156 calendar day time extension. Although in March 1989 the contracting officer thought that such 156-day extension was non-compensable because of purported concurrent contractor delays for lighting protection resubmittals, etc., we have found such delays were Government - responsible and compensable, or the Government has failed to show contractor responsibility therefor.

3. The remaining alleged delays. In its claim Kaco asserted that, after it started installing the fire alarm transmitters and related components and after it had energized the new fire station building, Government acts or omissions were responsible for 885 additional days of delay (71 days due to the beneficial occupancy requirement, 319 days relating fire alarm connections, and 495 days related to testing and adjusting the alarm system). After acknowledging some "concurrencies," Kaco winnowed its entire delay damages claim down to 474 days. (Finding 80) Eliminating the previously discussed 153-day frequency delay and the claimed 121-day oil switch delay, for which no "concurrencies" were conceded, leaves a 200-day balance for the remaining alleged compensable delays:
(a) "the ROICC requir[ing] BOD of the new building prior to switchover" and
(b) "misdirection and nondirection from the Navy regarding switchovers," which caused the contract to be "extended by 184 additional days." (App. br. at 9-16)

To prevail on its delay damages claim, appellant must demonstrate that specific delays were attributable to Government-responsible causes, that these delays resulted in delay to the overall project, and that the Government-caused delays were not concurrent with delays within the contractor's control. *See Rivera Construction Co., Inc.*, ASBCA Nos. 29391, 30207, 88-2 BCA ¶ 20,750 at 104,855-56. However, the record indicates that, to the extent the Government bears responsibility for any part of the remaining alleged delays, once appellant started installing the alarm system transmitters and antennas, contract performance "would have been . . . delayed or interrupted by . . . other cause[s], including the fault or negligence of the Contractor."

Appellant's subcontractor, G & L, and G & L's lead installer, Mr. Collier, lacked the experience and know-how needed to install the system properly or to connect the installed equipment to existing panels in an acceptable manner. Unrebutted evidence in the record establishes that the mounting of many antennas, which occurred during the installation phase of the work, and the connection (hookup) of transmitters and other components to existing panels were unacceptable, that the entire system installed and hooked up by Kaco and tested in October 1988 was unacceptable, and that Kaco did not tender an acceptable fire alarm system until sometime in May 1989. (Findings 35, 68, 70-74, 76, 83) We deny this claim element.

4. Constructive Changes. Despite the absence of Government-caused delays compensable under the Suspension of Work clause after the new fire station was energized in March 1988, the Government's administration of the contract was not without fault. Moreover, certain Government acts or omissions complained about by appellant caused constructive changes compensable under the Changes clause, while others did not.

a. Beneficial occupancy requirement. Kaco initially claimed that the ROICC's imposition in April 1988 of a requirement for beneficial occupancy of the new fire station caused a 71-day delay in commencing hooking up the alarm system in buildings throughout NTC and testing the switch-over of the base receiver to the new station on a building-by-building basis. Kaco calculated the 71 days from 5 April 1988, when it proposed to begin bringing the fire alarm transmitters on line in each building and to start testing the base alarm receiver in the new fire station, until 15 June 1988, when the Government accepted the lightning protection system and took beneficial occupancy of the new fire station. (Findings 46, 49, 50, 57, 79-80)

We have found that the contract did not require "the new fire station building [to] be fully habitable (i.e. BOD)" while hook-ups were being performed in other buildings or during testing of the base receiver in the new fire station prior to final turnover of the complete system. The ROICC's imposition of this requirement was outside the contract and constituted a constructive change, entitling appellant to an equitable adjustment to the extent that the cost or time required for performance was increased thereby. (Finding 50)

Although the ROICC's insistence on "BOD," particularly with respect to the lightning protection system, interfered improperly with Kaco's efforts to hook up and check out the system, this extra-contractual requirement did not increase the time required for performance. Among other things, the base receiver was not hooked into the new fire station until on or about 12 April 1988 and Kaco had not completed testing the transfer switch and generator until 20 April 1988. (Findings 49, 51)

During the period between 20 April and 15 June 1988 Kaco also was engaged in completing construction of the new fire station. Among other things, the air conditioning system, which had been placed in service at the end of March, had not passed required air flow tests. Problems with the system's air flow were not resolved until a representative of the project architect recommended correcting the ductwork installation, which the Government directed Kaco to perform. Moreover, Kaco still had to install the lightning protection system. Meanwhile, Kaco did not start installing aluminum coping for the lightning protection system until 22 April 1988, more than two months after its coping submittal had been approved, and did not complete the coping installation until sometime in May, because of its own deficiency in using incorrect sealant material. (Findings 47, 53, 57)

Kaco was not ordered to stop work while the parties attempted to resolve their disagreement over the lightning protection system design. Moreover, the Government's direction that Kaco resubmit Transmittal No. 32 shop drawings for its system, specifically identifying variances from the design reflected in drawing sheet E-7, was clearly within the scope of the FAR 52.236-21 Specifications and Drawings for Construction clause. Paragraph (f) of that clause requires the contractor to describe specifically in writing any variations from the contract plans shown in its shop drawings and the Government had a right to insist upon such description of variances. *See R. J. Sullivan, Inc,* ASBCA No. 48512, 96-1 BCA ¶ 28,203 at 140,763; finding 5.

The specifications covering the lightning protection system were mainly performance specifications, responsibility for the satisfaction of which was assumed by the contractor. *See J. L. Simmons,* 412 F.2d 1360 (Ct. Cl. 1969). The ROICC's 31 May 1988 letter to Kaco properly undertook to treat demonstrated deficiencies in the original lightning protection system design reflected in drawing sheet E-7 as compensable, constructive changes. The record shows that the Government's original lightning protection design did not fully satisfy UL and NFPA requirements. (Findings 9, 54, 55) Therefore, we conclude that Kaco is entitled to an equitable adjustment to compensate it for the expense it incurred, if any, preparing that portion of its original Transmittal No. 32 shop drawings that corrected specific deficiencies in drawing sheet E-7.

In addition, the record shows that on or about 20 April 1988 Kaco's electrical subcontractor, G & L, was ready to begin the hookup phase of the alarm system installation.

Appellant would then have started connecting transmitters to existing panels and testing signals from each building at the base receiver, but for the Government's imposition of the extra-contractual BOD requirement. The ROICC's refusal to permit NTC fire department personnel to stand watch in the new fire station, or in other buildings, to facilitate monitoring and testing of alarm signals prevented G & L from starting its hookups until at least 15 June 1988. (The hookup activity actually commenced on 18 June 1988.) (Findings 49-51, 58) Kaco is entitled to be compensated for any extra costs it incurred because of the disruption of G & L's work on the fire alarm system installation.

b. Condition of existing panels. Kaco's electrical subcontractor, G & L, discovered that many existing alarm panels in buildings throughout NTC were inoperable as soon as it began hooking up the new alarm system. Despite the NTC fire chief's assertion that all existing alarm panels were working prior to contract award, the record indicates that the condition of these panels was "poor." (Findings 59, 61, 63) Kaco claims that the Government is responsible for the time and effort its electrical subcontractor had to spend making the existing local alarm panels fully operable.

Kaco couches its claim in terms of the Navy's failure to disclose that "many of the existing fire alarm panels to which Kaco was to attach radio transmitters were not working properly or, alternatively, . . . [its] fail[ure] to assure that the existing panels did work properly" (app. br. at 2). This characterization of its claim suggests a "superior knowledge" theory that is not supported by the record, since it is not clear whether the Government actually knew that many of the existing panels were not working before it issued its solicitation. (Findings 11, 59, 61) Nevertheless, fixing the Government's liability for changes does not depend on establishing its superior knowledge concerning the condition of the local alarm panels.

The specified new radio fire alarm equipment that appellant was required to install did not include local alarm panels. Instead, the contractor was required to hook its new transmitters into existing alarm panels in each building. (Finding 10) The contractor was not required to repair or service the existing panels to make them operable. To the extent that it was necessary for Kaco to repair any panels to make them work, including the four panels from which all electronics had been removed, the contractor is entitled to be compensated for this extra work under the Changes clause.

Kaco made a reasonable site investigation. Moreover, nothing in the record establishes that a reasonable site investigation included testing local alarm panels to determine whether they operated properly, or that such testing would even have been permitted by the Government during a site visit.

c. Missing schematic drawings. The record indicates that schematic drawings needed to aid in wiring the new alarm transmitters were missing from the alarm panels in approximately seven buildings. Therefore, such panels were not suitable for the intended

use. To the extent that schematics for the panels in these buildings were not available in the Public Works office at NTC and either had to be ordered from manufacturer's by Kaco's subcontractor or could not otherwise be obtained and had to be reconstructed, appellant is entitled to an adjustment for the costs incurred in performing this extra effort. (Finding 60)

d. Access to mechanical rooms. The Government construction representative acknowledged that there were occasions, especially during hook ups in June and July 1988, when Kaco's electrical subcontractor could not gain access to mechanical rooms in certain buildings because keys to the rooms were unavailable. To the extent that the buildings in which G & L was unable to gain access to mechanical rooms were listed on a schedule provided to the Navy by G & L, appellant is entitled to be compensated for the extra cost associated with the effort entailed. (Finding 62)

e. Additional relays and contacts. On some occasions G & L had to acquire and install additional relays and contacts to existing panels to enable them to transmit "trouble" signals to the base receiver in the new fire station. The contract plans required the addition of relays to coded wheel type panels and to those panels with end-of-line circuits which could signal trouble locally. However, certain panels without end-of-line circuits could not signal trouble without being reworked extensively. The Government's January 1989 direction to Kaco to install relays and contacts to indicate trouble on approximately six panels that did not include end-of-line circuits constituted a change for which appellant is entitled to an equitable adjustment. (Findings 65-67)

f. Antenna relocation. A portion of appellant's claim, sponsored on behalf of its electrical subcontractor, G & L, includes an approximately $1,300 item for renting a bucket truck to move antenna locations higher than 20 feet above the pavement (finding 82). This claim is grounded in G & L's contention that the Government and SIGCOM gave it inconsistent instructions concerning antenna mounting and height and its belief that none of the antennas needed to be installed above 20 feet. The fire protection (FP) drawings clearly directed the contractor to install numerous antennas more than 20 feet above the pavement and SIGCOM's product literature regarding antenna installation cautioned the installer to conform to any contract requirements. (Findings 11b, 34, 74, 81) The contention is without merit.

g. Inaccurate punchlist items. The portion of appellant's claim sponsored on behalf of G & L also includes an item for time and costs expended checking out inaccurate punchlist items. Appellant and G & L do not deny the presence of various discrepancies, which required correction. However, the record establishes that on some occasions the Government listed the need for corrections in buildings in which there were actually no discrepancies. (Finding 71) The Government's rights under the FAR 52.246-12 Inspection of Construction clause do not relieve it from liability for costs incurred by the contractor in the examination of previously rejected or punchlisted work found to meet contract requirements and appellant is entitled to an adjustment for the additional services involved.

h. Other alleged constructive changes in original claim. Kaco's claim had sought specific monetary adjustments for the following alleged constructive changes: (1) providing sod; (2) air conditioning ductwork; (3) asbestos removal; and (4) extra consulting services performed by Mr. Earley (finding 81).

(1) Sod. Kaco protested the Navy's March 1988 direction to install sod around the new fire station, after it had seeded the area. However, paragraph 3.2 of the "Grassing" expressly provided for the laying of sod. This provision remained in effect by virtue of the Government's failure to award Additive Item No. 4, which would have substituted "landscaping and irrigation in lieu of sod." (Findings 2, 7, 48) The protest and resulting claim are without merit.

(2) Ductwork. Kaco protested the Navy's direction to modify a portion of the air conditioning system ductwork, asserting that the ductwork change would not improve the air flow. Appellant presented no evidence to support this assertion and this claim element must be denied because of failure of proof that the protested work involved the correction of a defect. (Finding 57)

(3) Asbestos removal. In May 1987 Kaco obtained a $4,230 proposal from a subcontractor for removing asbestos from the old fire station, planned to commence during the latter part of January 1988. The claim is based on asbestos removal subcontractor's withdrawal of its proposal in November 1988 and Kaco's need to obtain the asbestos removal services at greater cost. (Findings 19, 75) The claim lacks merit. Appellant assumed the risk of a price increase when it failed to formalize its subcontractor's proposal and failed to demonstrate any caused connection between phase A delays and commencement of the asbestos removal.

(4) Mr. Earley's services. The contract expressly required Kaco to provide the services of a qualified and experienced manufacturer's representative "to supervise the installation, testing (including final testing) and adjustment of the system" and Kaco designated Mr. Earley to fill that role. Its claim is based on the Navy's specific direction to it in August 1988 to provide a manufacturer's representative to supervise hookup procedures and its allegedly not having anticipated that Mr. Earley would have to spend so much time at the site. (Findings 10a, 33, 69) The claim is devoid of merit. Providing a qualified manufacturer's representative to oversee the installation and testing of the system was the contractor's responsibility and the Navy's direction was consistent with the contract. The owner is not obliged to compensate the contractor for underestimating the extent of the services required to be provided.

5. Government Claim for Liquidated Damages. Having been the subject of a contracting officer's decision from which a timely appeal was taken, the Government's $7,200 liquidated damages claim is properly before us. *See* Contract Disputes Act (CDA)

Section 6(a), 41 U.S.C. § 605(a). The 32-day liquidated damages assessment was measured from the time specified for completion of Phase A of the contract, as amended by Modification Nos. P00003 and A00007, 15 June 1988, to the putative completion of "connection [*i.e.*, hookup] of the new fire alarm system, also a part of the Phase A work," on 17 July 1988. (Finding 84)

That portion of the contracting officer's decision assessing liquidated damages appears to treat the beginning time for measuring the assessment as the date "the Government took partial use and possession of the Phase A work, specifically the fire station building," previously referred to by the ROICC as the "beneficial occupancy" date or 'BOD." (Findings 50, 56, 84) This is an anomalous approach to measuring late completion, especially since the terms beneficial occupancy and substantial completion are sometimes used interchangeably and liquidated damages will not usually be assessed after the work is substantially completed.

Nevertheless, even though the Government has taken beneficial occupancy of a part of building being constructed under a contract, it may still be entitled to assess liquidated damages if the work was not substantially completed, in the sense of being usable by the Government "for the purpose for which it was intended." *Nagy Enterprises*, ASBCA No. 48815 *et al.*, 98-1 BCA ¶ 29,695 at 147,204; s*ee Mit-Con, Inc.*, ASBCA No. 44509, 93-2 BCA ¶ 5,570; *Fred Loffredo*, ASBCA No. 22218, 82-1 BCA ¶ 15,509; *Martell Construction. Co.*, ASBCA No. 23679, 80-1 BCA ¶ 14,429.

In this case, the Government's taking of beneficial occupancy of the new fire station building on 15 June 1988 would not preclude the assessment of liquidated damages from the scheduled completion date until appellant completed connecting the new base-wide fire alarm system to the base receiver, a fundamental requirement of the project. Without connecting the new alarm system, the new fire station could not be used for its intended purpose. The contracting officer determined that connection of the new system was completed on 17 July 1988.[6]

However, we have determined that appellant is entitled to time extensions amounting to 176 days resulting from compensable Government-caused delays; 153 days for the frequency assignment delay plus 23 days for the oil switch delay. Our determination extends the time specified in the contract for completing Phase A of the work an additional 20 days, to 5 July 1988. Accordingly, the Government's entitlement to assess liquidated damages for late completion of Phase A work at the rate of $225 per day must be reduced by 20 days ($4,500), leaving $2,700 in liquidated damages properly assessed.

SUMMARY

Appellant's appeal from that portion of the contracting officer's decision denying its claim in part is sustained to the extent that appellant is entitled to time extensions and

compensation for 176 days of Government-caused delay and to be compensated for constructive changes as indicated in Section B.4, above, and is in all other respects denied. The matter is remanded to the parties for negotiation and determination of the amount due appellant.

The appeal from that portion of the contracting officer's decision assessing liquidated damages is sustained in the amount of $4,500 and is in all other respects denied.

Dated: 2 June 1999

JOHN J. GROSSBAUM
Administrative Judge
Armed Services Board
of Contract Appeals

I concur

PAUL WILLIAMS
Administrative Judge
Chairman
Armed Services Board
of Contract Appeals

I concur

DAVID W. JAMES, JR.
Administrative Judge
Acting Vice Chairman
Armed Services Board
of Contract Appeals

NOTES

[1] In May 1987, Kaco had obtained a proposal in the amount of $4,230 from Environmental Services of the Southeast, Inc. (ESSI) for asbestos removal at the existing fire station. In late November 1987, Kaco issued a purchase order to ESSI to remove asbestos. However, by November 1987 completion of the new fire

station and commencement of demolition of the existing station were already far behind schedule and Kaco didn't even submit its shop drawings for asbestos removal and disposal until 28 April 1988. (R4, tabs VIII-Q, -R)

[2] SIGCOM preferred simply to be a material supplier, rather than a subcontractor as preferred by Kaco. Although there is no evidence suggesting any disagreement concerning the price of the transaction, it appears that SIGCOM and Kaco disagreed over proposed payment arrangements. Nevertheless, these arrangements were resolved well before any shipments were ready.

[3] Public Works would give a contractor copies of schematics if more than one copy was available, but if only a single copy existed, the contractor had to create a drawing of what he needed at the Public Works office.

[4] Although Modification No. A00007 stated, *inter alia*, that the contractor was not required to sign the instrument, Kaco's president signed the instrument on 17 March 1989 (R4, tab I-E). Apart from the additional time granted by unilateral Modifications Nos. P00003 and A00007, the contract term was not otherwise extended.

[5] At the hearing, a consultant retained by Kaco described a "PERT Construction Schedule: As Planned vs. As Built" he had prepared in anticipation of the litigation, but this after-the-fact presentation had little probative value (app. supp. R4, tab 2-B; tr. 3/111)

[6] The entire new fire alarm system appears to have been accepted some time later (see finding 83).

I certify that the foregoing is a true copy of the Opinion and Decision of the Armed Services Board of Contract Appeals in ASBCA No. 46346, Appeal of Kaco Contracting Co., rendered in conformance with the Board's Charter.

Dated:

EDWARD S. ADAMKEWICZ
Recorder, Armed Services
Board of Contract Appeals